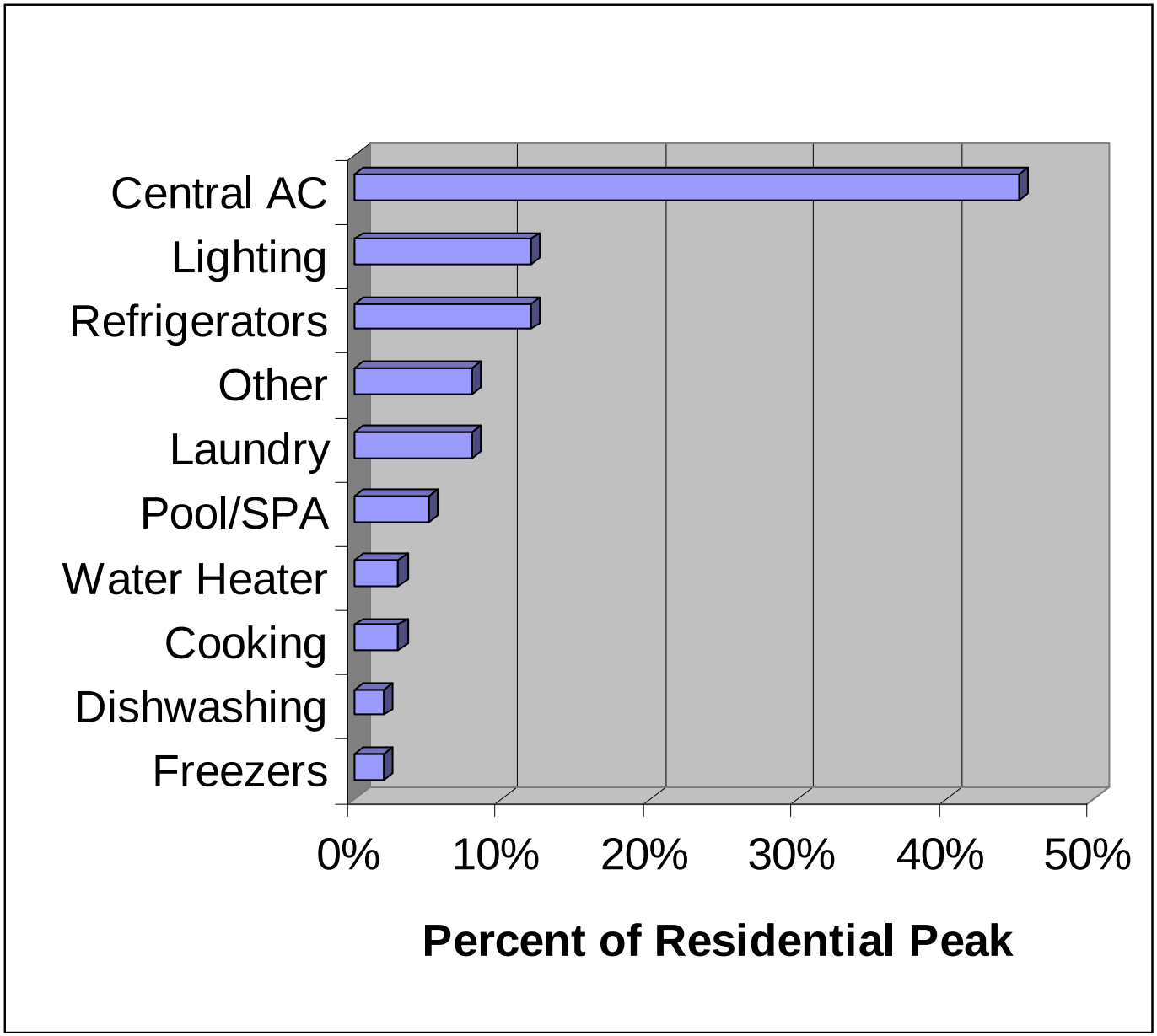
New California T-24 Energy Code Regulations

HVAC Change-outs and Duct Testing

Why Change-Outs?

Energy Standards are starting to address energy efficiency of existing homes and businesses as well as new buildings.


Central AC
Lighting
Refrigerators
Other
Laundry
Pool/SPA
Water Heater
Cooking
Dishwashing
Freezers
0%
10%
20%
30%
40%
50%
Percent of Residential Peak

Duct Testing

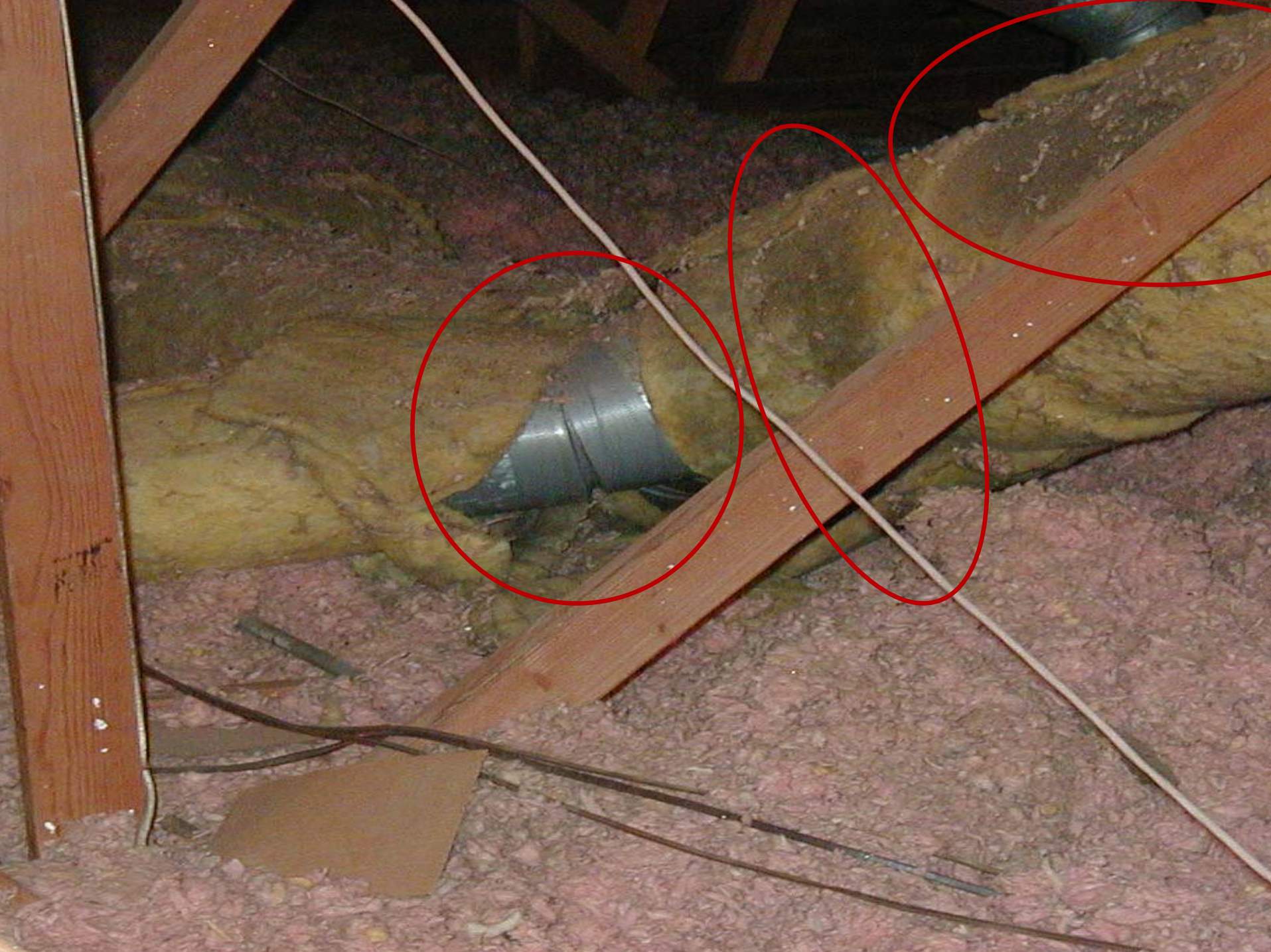
1. Residential New Construction
2. NonResidential New Construction
3. Residential HVAC System Change-outs (in some climate zones)
4. NonResidential HVAC Change-outs (in all climate zones)

Typical Leakage Rates for Residential Systems

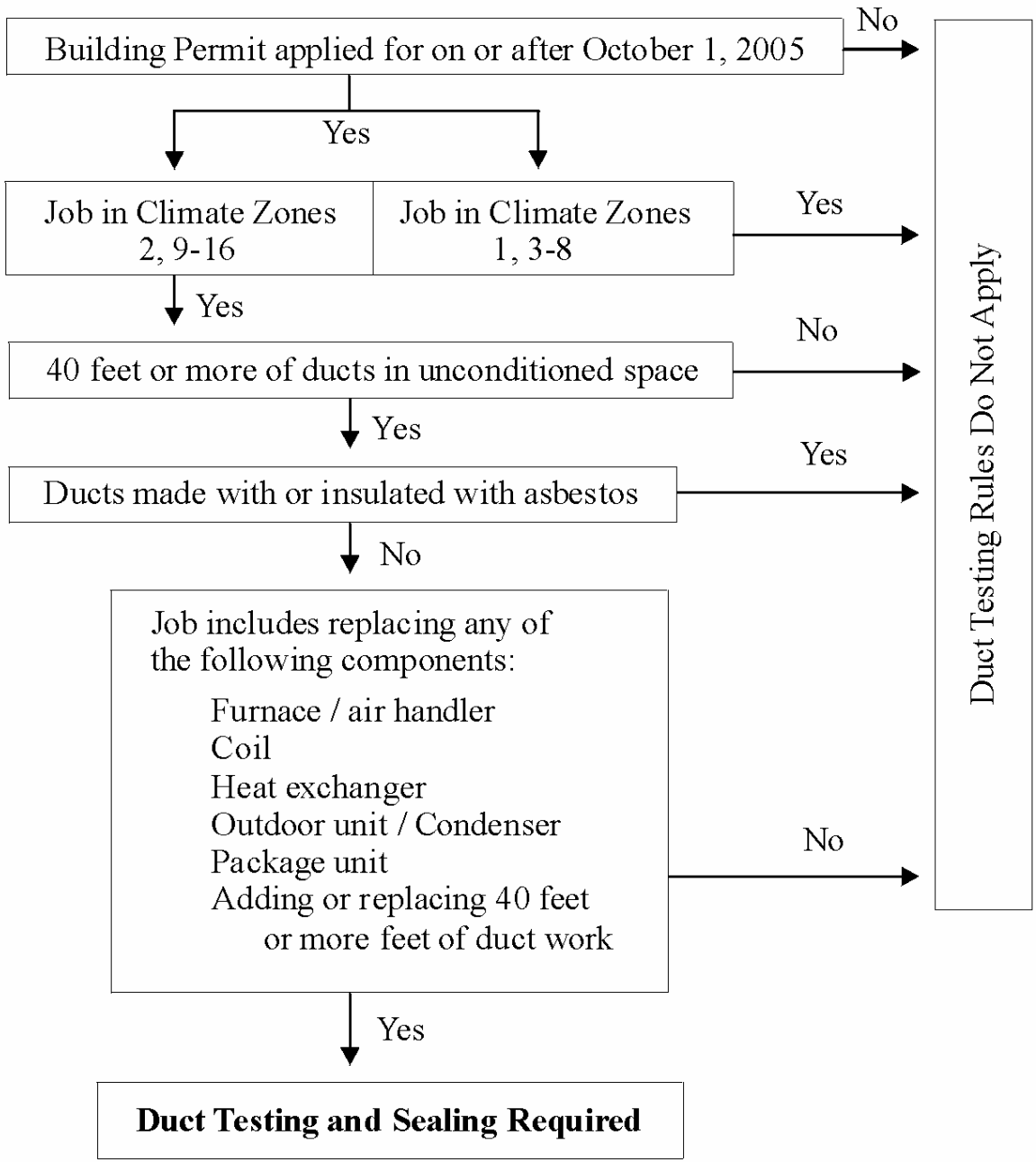
Statewide average duct leakage in existing residential systems: 28 - 35%

3-ton @ 400 cfm = 1200 * .28 = 336 cfm

Quick Review of Common Duct Problems



Residential HVAC Change-Outs



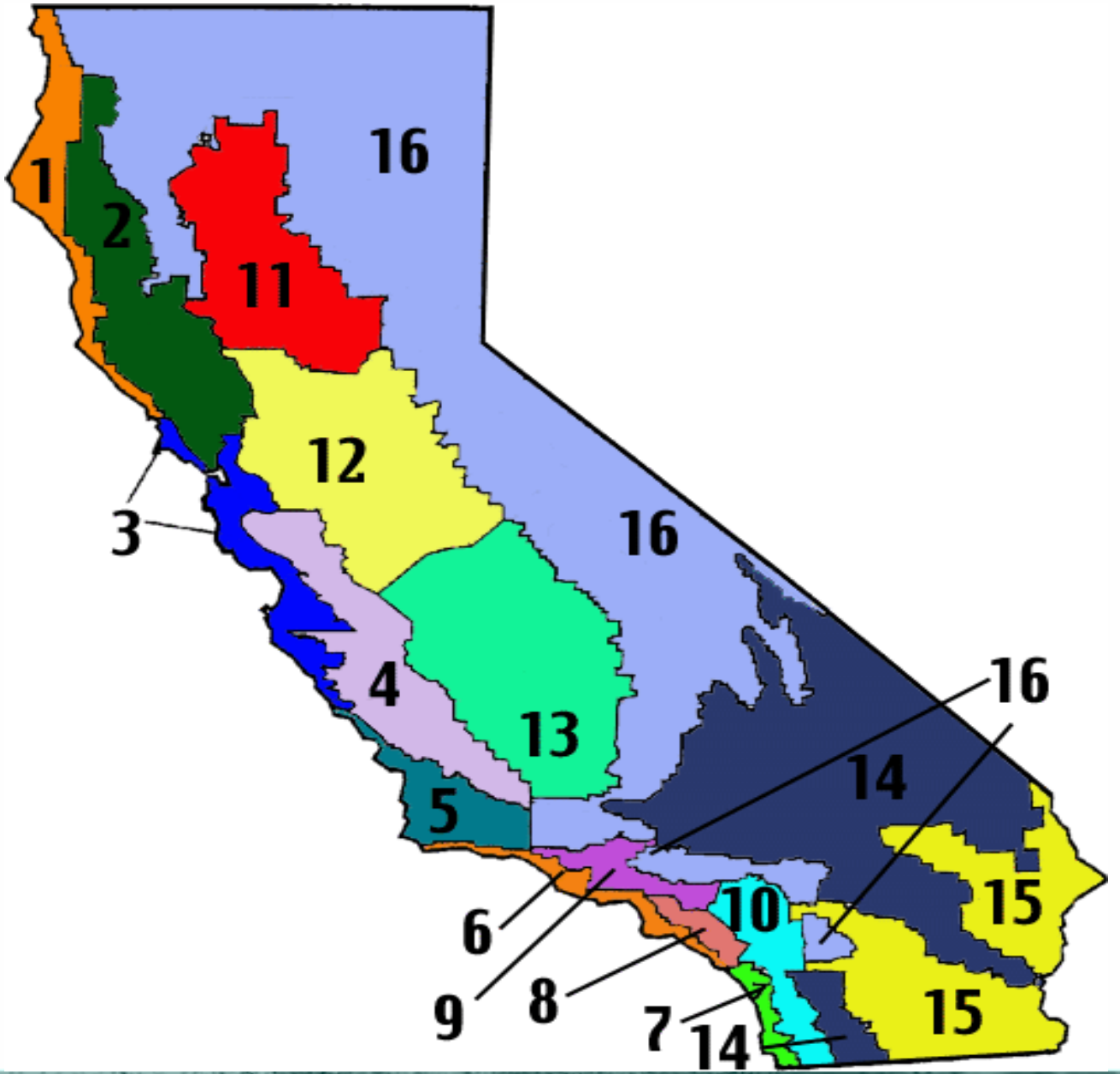
Climate Zones

Residential Duct Testing Rules

Apply **ONLY** in Climate Zones:
2, 9, 10, 11, 12, 13, 14, 15 & 16

Exempt Climate Zones
1, 3, 4, 5, 6, 7, 8

California Climate Zones



Maximum Leakage Rate Targets

"Existing Duct Work"

1. **15% of fan flow**

   400 cfm/ton * .15 = 60 cfm
   3 tons * 60 cfm = 180 cfm target

2. **60% Reduction**

   Test before replacement and after:

   600 cfm initial test (example only)
   60% reduction = 240 cfm target

3. **Duct leakage to outside of house 10% or less**
   (whole house blower door test plus duct leakage test)

4. **Seal all accessible leaks and verify by HERS Rater**
   (with "smoke").

Maximum Leakage Rates
Completely New Duct System

HVAC system change-outs that include all new duct work – same duct testing standards as new construction.

6% of air flow (24 cfm / ton)

Verification

1. **Contractor tests**

   Every home is tested by the contractor.

2. **HERS Rater verifies**

   Homes are verified according to Home owners request or by sample rules.

Residential Alternatives

Are there any alternatives to performing the duct sealing and testing?

Table 8-3 – Alternatives to Duct Sealing and Refrigerant Charge Measurement

	Option 1, Heating Option,	Option 2, Cooling Option	Option 3, Combo Heating and Cooling Option
Climate Zone	0.92 AFUE	SEER14/ EER-12, plus TXV (or refrigerant charge measurement), plus Increased Duct Insulation	SEER-14/ EER-12 with TXV (or refrigerant charge measurement), plus either 0.92 AFUE or 0.82 AFUE plus Increased Duct Insulation
CZ2	Yes	No	Yes
CZ9	No	No	Yes
CZ10	No	Yes	Yes
CZ11	No	No	Yes
CZ12	Yes	No	Yes
CZ13	No	Yes	Yes
CZ14	No	No	Yes
CZ15	No	Yes	Yes
CZ16	Yes	No	Yes

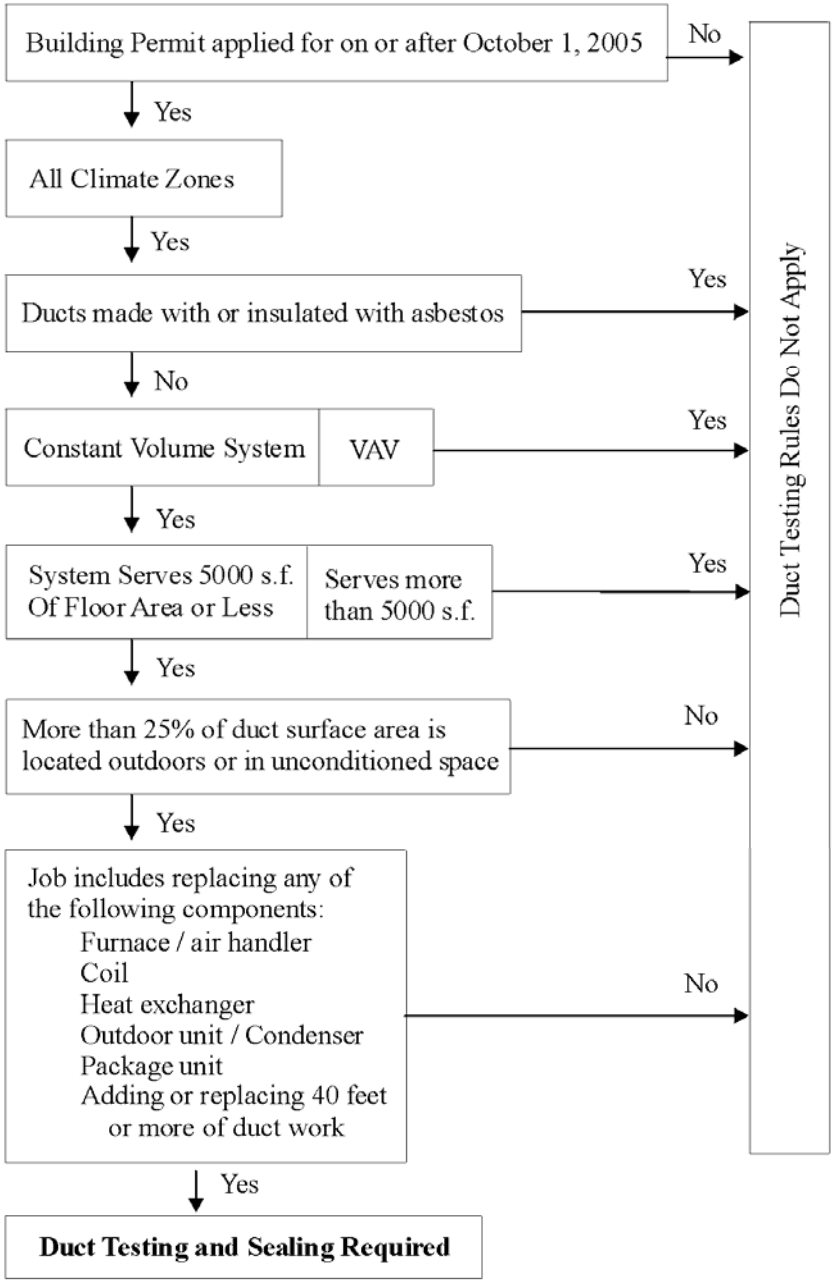
1. Increased duct insulation refers to an additional R-4 insulation wrap on existing ducts and R-8 duct insulation for all new ducts.

2. In climate zone 8, to avoid TXV or refrigerant charge measurement requirements, a SEER 14 or a 0.82 AFUE may be used.

3. Package systems may use Option 2 or 3 without meeting the TXV (or refrigerant charge measurement)

Note - There are no duct sealing requirements in climate zones 1 and 3-8.

NonResidential Change-Outs



Maximum Leakage Targets
Existing Ductwork

1. **15% of fan flow**

   400 cfm/ton * .15 = 60 cfm
   3 tons * 60 cfm = 180 cfm target

2. **60% Reduction**

   Test before and after replacement
   For example: 600 cfm initial test

   60% reduction = 240 cfm target

3. **Seal all accessible leaks**

   Verified by HERS Rater (usually with “smoke”)

Maximum Leakage
Completely New Duct System

HVAC system change-outs that include all new duct work

6% of air flow (24 cfm / ton)

NonRes Alternatives

Are there any alternatives to performing the duct sealing and testing?

Table 4-5 – Single Zone Air-Conditioner Efficiency Deemed Comparable to Duct Sealing

CTZ	Air conditioner < 65,000 Btu/h SEER/EER	Air conditioner ≥ 65,000 Btu/h EER	Heat Pump < 65,000 Btu/h SEER/EER	Heat Pump ≥ 65,000 Btu/h EER
1	13.5/11.2	11.3	12.7/10.6	11.0
2	13.8/11.4	11.5	13.3/11.0	11.5
3	13.2/11.0	11.1	12.9/10.7	11.0
4	13.4/11.1	11.3	13.1/10.9	11.2
5	13.2/11.0	11.0	13.0/10.8	11.0
6	13.1/10.9	11.0	13.1/10.9	11.0
7	13.3/11.0	11.1	13.3/11.0	11.1
8	13.5/11.2	11.3	13.4/11.1	11.3
9	13.7/11.4	11.4	13.6/11.3	11.4
10	13.9/11.5	11.7	13.9/11.5	11.7
11	14.2/11.8	11.9	13.3/11.0	11.7
12	14.0/11.6	11.9	13.3/11.0	11.9
13	14.3/11.9	12.0	13.7/11.4	11.9
14	14.2/11.8	12.0	13.6/11.3	11.9
15	14.5/12.0	12.1	14.5/12.0	12.1
16	14.0/11.6[1]	12.1[1]	13.0/10.8	11.7

Response to Code Change

- **Douglas Beaman Associates** has Trained
  - Over 1500 Contractors in the use of Duct Blasters during a 12 month period.
  - Several **Building Jurisdictions** requested 2005 Code training sessions.
  - Several **HVAC contractors** had custom sessions for their installers.
  - In 2005 CHEERS recertified 150 Raters.
  - In 2005 CHEERS trained 460 new Raters.

Other Changes to the 2005 Code

- TDV base for energy calculations
- Residential Lighting.
- New credit for Quality Insulation Installation — Requires HERS Verification.
- New Credit for Adequate Airflow — Requires HERS Verification.
- New Credit for Fan Watt Draw — Requires HERS Verification.

Cooperation within the HVAC Industry

- IHACI – Institute of Heating and Air Conditioning Industries
  - Organized a series of training seminars for its members and others.

Cooperation within the HVAC Industry

- The Utilities such as PGE (Pacific Gas and Electric), SDGE, SoCal Gas and SoCalEdison were all involved in training.
  - Organized, provided printed materials and training at many locations throughout California to assist the education of HVAC Contractors, Developer/builders, Building Officials, Architects and others.